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ABSTRACT

This study analyzed the relationship between the occupational decisions of teachers or potential teachers and salary differences that exist between teachers and workers who are employed in alternative occupations. Occupational choice theory is reviewed, and research related to teacher salary, teacher recruitment, and teacher retention is analyzed. A conceptual model of causal relationships among variables in determining the occupational decisions of both prospective and practicing teachers is presented. A sample of teachers or potential teachers was drawn from the National Longitudinal Study of the High School Class of 1972 (NLS-72), its five follow-up surveys, the Postsecondary Education Transcript Study, and the Teaching Supplement questionnaire, resulting in 737 valid cases for the study of attraction to teaching and 495 cases for the study of retention. Findings indicate that the level of teachers' earnings relative to alternative occupations pursued by college graduates has a direct effect on occupational decisions of prospective and current teachers. Women showed a lower response to earnings than did men. The analysis confirmed the effects of various predictors of choosing and leaving teaching--gender, race, family background, the level of teaching, school type, subject specialty, and satisfaction with teaching. (Contains approximately 60 references.) (JDD)

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ED 376 125

The Impact of Teacher's Salary upon Attraction and Retention of Individuals in Teaching: Evidence from NLS-72

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The Background and Objectives

There has been an increasing concern about teacher compensation over the past several years. Futrell (1984) noted that every major national report on education released in 1983 stated strongly that raising teacher salaries should be a high priority of the educational reform movement. The belief underlying the concern is that increases in teacher salaries would induce more college students of high ability to select teaching as a career (Manski, 1984) and encourage superior teachers to remain in the profession (Goodlad, 1983; National Commission on Excellence in Education, 1983).

In spite of the level of interest in improving teacher compensation, it is surprising that a review of the relevant literature provides only limited support for the proposed policy. Some contend that individual decisions to choose and/or remain in the teaching profession are influenced to a greater extent by intrinsic, non-pecuniary benefits than by material rewards (Chapman and Hutchenson,1982; Johnson, 1984). Lortie (1975) argues that teachers want to teach, although the monetary reward is important. Conversely, many believe that teachers are no different than workers in other occupations where money is used effectively as an incentive (Zabalza et al., 1979).

Contrary to popular belief, there is evidence that educators are at least as responsive as other workers to inter occupational wage differences in deciding to choose and change occupations (Manski, 1984; Rumberger, 1987). In addition, these writers argue that raising salaries will attract and retain more and better qualified teachers. Yet, even among supporters of increased pecuniary rewards, there has been little empirical analysis concerning the impact of teacher salaries on the supply of teachers.

The purpose of this study was to investigate the impact of teachers' earnings on the occupational decisions of individuals in teaching. The focus of this analysis was the relationship between the occupational decisions of teachers or potential teachers and salary differences that exist between teachers and workers who are employed in alternative occupations.

Perspectives

With the purpose of providing a theoretical framework and research regarding the effect of teacher salary on the supply of teachers, a discussion of occupational choice theory as presented by Zabalza (1979) and Zabalza, Turnbull, and Williams (1979) was reviewed. To provide further framework for the study, the research evidence related to teacher salary, teacher recruitment, and teacher retention was analyzed.

The Theory of Occupational Choice

Human capital theory views educational choice as an act of investment which is governed by an evaluation of future returns. This idea can be extended to the related issue of occupational choice (Zabalza, Turnbull, and Williams, 1979). The theory of occupational choice is built upon assumptions about individual behavior within a specific economic and non-economic environment. Choices among occupations may be viewed as acts of investment which are guided by their expected return. According to Ehrenberg and Smith(1988), the theory of occupational choice is based on three assumptions; utility maximization, worker information, and worker mobility.

In the economic literature, occupational choice has been interpreted as a decision which will be determined by the expected lifetime earnings associated with each of the available alternatives.

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Despite its apparent simplicity, it has been difficult to incorporate this idea into the analysis of occupational choice, the main reason being the inadequacy of empirical data on earnings. Given this difficulty, some models of occupational choice have from the outset formulated the problem as a one-period decision. All the work carried out to investigate the factors determining the choice of a military career belongs to this class of models (Altman, 1969; Altman and Barro, 1971). Other researchers have taken into account the effect of lifetime earnings in their theoretical analysis, but have focused their empirical work more heavily on evaluation of rates of return than on estimating supply elasticities (Weiss, 1972).

One of the most extensive works on occupational choice has been that of Freeman (1971). He postulates that new entrants look at their expected starting salary when making their occupational decisions and that changes in starting salary profoundly affect occupational choice. His empirical analysis considers either starting or average salaries as the relevant variables of the occupational choice, and in this sense it is not substantially different from the studies on military manpower reported above. In his analysis of career decisions of doctorate manpower, however, he explicitly takes into account lifetime earnings as the explanatory variable of occupational choices.

Building upon Freeman's work (1971), Zabalza (1979) developed a theory in which the supply of new teachers and the proportion of leavers depend partly on the starting salary that is offered, partly on the (discounted) earnings that are expected throughout a whole teaching career as compared with prospective earnings in other possible occupations, and partly on the probability of obtaining jobs in the desired occupation. According to Zabalza (1979), the occupational decision is analyzed by means of comparisons of the pecuniary returns that might be anticipated from different courses of action. The theory assumed that, non-pecuniary preferences being equal, the individual has the possibility of entering two different occupations, A and B (i.e., A: teaching, B: any other alternative occupation). The relative supply for occupation A would be a function of the relative wage, a description of the profiles of earnings offered by the two occupations, employment probabilities, and the subjective rate of discount may be relevant in determining occupational choice.

The above discussion has been couched in terms of the entry decision, but a similar argument can be developed for the leaving decision. The leaving rate is defined as the proportion of teachers in an age group leaving the teaching profession during a certain year.

In this context, the theory predicts that salaries do make a difference. The supply response to a change in wage is, as one might expect, larger for male graduates than for female graduates. Not only starting salaries, but the whole salary profile, affect the number of individuals entering teaching (Zabalza et al, 1979).

Despite the systematic effort to develop the economic theory of occupational choice by Freeman and Zabalza, there is an argument that the theory does not satisfactorily treat the potentially important effects of future demand conditions on occupational choice (Zarkin, 1985a). Zarkin (1985a) developed a rational expectation model in which agents look beyond expected starting salaries and take explicit account of future demand conditions. According to Zarkin (1985a), the empirical results demonstrate that future trends in the number of children are important determinants of the decision to acquire public school certification.

However, the research evidence consistently indicates that the total supply of teachers does, in fact, respond to salary levels. Zarkin (1985b), even though he criticized the previous works on occupational choice, analyzed the trends in total teacher supply and demand in the U.S. and found that the number of people available to teach is positively related to the level of teacher's salaries and negatively related to the level of salaries in alternative occupations.

Teacher Salary

It is generally agreed that the most important determinant in providing an effective educational system is the quality of the classroom teachers. It is also true that in our society a person's status in the community is determined largely by accumulated wealth or level of income

generated. Therefore, the salary paid professional personnel is an indicator of the economic health of the profession (Salmon, 1988) and is probably the single most important award that an organization can offer (Dyer, Schwab, and Fossum, 1978).

It is widely reported that teachers receive much lower salaries than workers in many other professions. According to Levin (1985), teacher salaries historically have been lower than other occupations pursued by college graduates. The recent Carnegie report, A Nation Prepared(1986), points out that in 1985 the average salary of attorneys was $51,400, engineers was $39,500, accountants was $36,500, and teachers averaged $23,500.

Despite the recent attention given the low salaries paid to teachers by numerous public school reform efforts, the relationship between the salaries paid teachers and those in other professional groups has not changed. In fact, the fiscal effort generated by the nation for both current expenditures and salaries of teachers declined from 1976-77 to 1986-87 (Salmon, 1988).

According to Miller (1985), in the period from 1917 to 1950 almost all public school districts in this country adopted some version of the uniform or single salary schedule. Currently over 99% of teachers are employed in school districts that use uniform salary schedules. Stern (1986) states that salary increments are automatically awarded for each year or two of additional service, but usually no increments are given beyond the 15th or 20th year. In addition, teachers receive higher pay when they accumulate credits for education beyond the bachelor's degree. The accumulation of seniority and educational credits results in higher salaries for older teachers than for younger ones. According to Nelson (1986), the average teacher salary increased 15% between 1983 and 1985, while the average salary for beginning teachers increased 11% in just one year. Data from New York also indicate that from 1973 to 1983, school districts distributed significantly larger percentage increases to veteran than to novice teachers (Monk and Jacobson, 1985).

Feistritzer's (1986) report on the status of teaching suggests that the gender differences in employment opportunities and earnings across and within occupations should be considered. Using different sources of data, the study shows average male teachers salaries were $25,817 in 1984 dollars and female teachers were $22,813, while all male college graduates had average earnings of $32,122 and all females only $16,894. Stern (1986) also found that earning profiles for male teachers were much lower than for all male earners in both 1969 and 1979. However, among females there was very little difference between the earnings of teachers and the earnings of the college educated labor force as a whole. In fact, it can be argued that teaching is not financially attractive for male college graduates as an alternative occupation, but it is attractive for females. These differences should be considered in examining the role of salaries in attracting and retaining teachers.

The Effect of Teacher Salary on Recruitment and Retention

Teaching, in particular, is one of the occupations in which it is widely believed that a strong sense of vocation is important, and surveys of secondary school pupils and university students often elicit responses indicating that intending teachers have a strong desire to work with children, or to do a job that they feel will be socially worth while. Recent literature also provides evidence that most practicing teachers say they are in the profession for reasons other than money, mainly having to do with their intrinsic desire to teach (Bacharach, Lipsky, & Shedd, 1985). However, the evidence reviewed in the following sections consistently indicates that both prospective and practicing teachers are influenced by salary levels.

According to Salmon (1988), anticipated financial compensation is one of several factors that are considered by people who confront career choice decisions. It is also widely believed that lower salaries relative to alternative occupations are responsible for teacher shortages and that higher salaries help reduce shortages. Rumberger (1987) found that salary differentials between teachers and alternative occupations influence teacher shortages. Manski (1984) analyzed information on individuals from the National Longitudinal Study of the High School Class of 1972. He found that higher salaries do attract more and better qualified teachers. Increases in expected earnings do attract more high ability students into teaching but they also attract more low

ability students. The average ability of the teaching force can be improved and the size of teaching force maintained if minimum ability standards are combined with a sufficient salary increase.

The aggregated data are consistent with findings from the data for individuals. Zabalza's (1979) analysis of aggregate trends in the United Kingdom also indicates that the levels of teachers' salaries relative to other fields was positively related to the number of new entrants into teaching. Teachers are also responsive to wage differentials within teaching in deciding to choose districts. A higher starting salary enables a district to recruit potential teachers more effectively (Baugh and Stone, 1982; Stern, 1989; Jacobson, 1986).

Goodlad (1983) addressed both positions when he pointed out that while money may not be the primary reason persons give for entering teaching, it does rank second as a reason for leaving. He speculated that teachers begin their careers with a willingness to forgo higher salaries, anticipating rewards intrinsic to their work; but if these expectations are frustrated, salaries become a source of considerable job dissatisfaction, which is often manifested in high rates of turnover. Goodlad's observation suggests that, while intrinsic reward are central to teacher labor market decisions, they are not sufficient to retain teachers if salaries are perceived as inadequate, or if intrinsic rewards are not forthcoming.

According to Jacobson (1988), retention is related to satisfaction with extrinsic rewards received and reward satisfaction is a function of comparisons between actual earnings and estimates of alternative earning potential. The effects of salary increases on teacher retention need to be examined in relative rather than absolute terms, since increases in salary will not improve reward satisfaction if the salaries do not improve comparisons between actual and alternative earnings. Baugh and Stone's (1982) analysis implies that an individual will leave teaching for another occupation if the individual is underpaid as a teacher, compared to potential earnings in other fields. The level of teachers' salaries relative to other fields was negatively related to the number of teachers who left the profession (Zabalza, 1979; Chapman and Hutcheson, 1982). All these results are consistent with the economic theory of occupational choice. They clearly indicate that both prospective and practicing teachers respond to monetary considerations.

Observations of occupational pattern reveal that the determinants of behavior can be differentiated on the basis of individual variables, for example, one's academic ability, gender, major area, and so on. Using longitudinal data (NLS-72), Manski (1984) analyzed the relationship among academic ability, earnings, and the decision to become a teacher. Among college graduates who were employed in 1979, he found a positive association between salary and SAT score for non-teachers, but not for teachers. He also found that individuals with higher SAT scores were less likely to be teaching. These findings are consistent with the theory that salaries influence occupational choice in general, and, in particular, that individuals with high SAT scores are relatively unlikely to choose teaching because they can obtain larger salaries in other fields. Manski's analysis implies that raising teachers' salaries would make it feasible to establish a minimum SAT score for teachers and still attract the same number of young people into teaching.

Although National Teacher Examination (NTE) scores are not necessarily related to measures of teacher effectiveness, evidence strongly indicates that teachers with high NTE scores are especially likely to leave teaching after only a few years in the classroom (Murnane, Singer, & Willett, 1989). Their findings suggest that schools tend to lose teachers with skills valued by business and industry .

The salary level, especially beginning salary, is included to capture quality differences among new teachers. The association of new teacher quality with beginning salary is straightforward (Dolan and Schmidt, 1987; Stern, 1989; Jacobson, 1986). The salary offered to beginning teachers and the relative salary of teachers are found to be the strongest predictors for size and cognitive ability of the teacher aspirant pool, followed by teacher demand and teacher employment (Thangaraj, 1985). Building from the Carsson-Robinson Theory of public employment wages, Owen (1971) investigated the determinants of teacher salary and quality. He concluded that teacher salaries were found to be determined by the level of per capita income in the systems employing them and by the salaries paid in competing occupations in the area. Teacher

quality is determined by the quality of the local labor supply and by the salaries offered to teachers. According to Schlecty and Vance (1981), there is a relationship between academic aptitude of teachers and retention. They found that rates of attrition among North Carolina teachers were higher for the most academically able third of teachers than the least able third.

Gender difference is also important in explaining the effect of salary on occupational choice. Zabalza (1979) reported that both men and women graduate new entrants to teaching respond to changes in relative earnings and unemployment. The analysis of leavers showed that, among men, trained graduates are more sensitive to changes in salary variables than either of the other two categories; not only of relative salaries but also of earning prospects. Women leavers show, in general, a much lower response to earnings than do men. However, contrary to what happens with male leavers, the effect of unemployment is marked.

Stern (1986) also states that for a young man, teachers' pay starts low and gets worse while for a college educated woman, prospective earnings in teaching still look very similar to earnings in other alternative fields. There appear to be gender differences in tastes for intrinsic and extrinsic rewards, with males reporting more preference for extrinsic rewards and females reporting more preference for intrinsic rewards, even though current and former teachers agree that improvement in both salaries and working conditions is necessary to attract and retain more teachers in the profession (Harris et al., 1985).

The teacher shortage within particular specialty areas such as science and mathematics also should be considered. Murnane et al. (1989) found that chemistry/physics, biology, and English teachers were almost one third more likely to leave than mathematics and social studies teachers. The area of chemistry and physics showed the highest attrition rate because these were areas commanding high starting salaries in business and industry. According to Levin (1985), because alternative occupations for college students with mathematics and science interests, such as engineering and computer science, have become relatively more attractive financially over the last decade, the areas of teaching such as mathematics and science face severe shortages. The salary differentials between teaching and alternative occupations influence the shortage and turnover of mathematics and science teachers (Rumberger, 1987).

According to Murnane, Singer, and Willett (1989), the career path of elementary teachers contrasts sharply with their secondary counterparts. Career decisions of elementary teachers are less sensitive to financial incentives, while in the case of secondary teachers, salary does play an important role in decisions to stay in teaching. The other significant difference between the two groups is that elementary teachers with high NTE scores are much more likely to remain in the classroom.

Data Source and Research Methodology

This study began with fourteen hypotheses which were derived from the six research questions. The research questions addressed in this study were as follows:

1. Do educational attainment, work experiences, gender, race, and other variables affect the earnings of individuals?
2. Does the difference between the earnings from a teaching job and from alternative jobs affect the decision on the part of those trained for teaching to choose teaching as one's career ?
3. Do academic ability, years of education, gender, race, family background, and academic major affect the decision to choose teaching as one's career?
4. Does the difference between the earnings from a teaching job and from alternative jobs affect the decision to leave teaching by those who have teaching experience?
5. Do the years of education, gender, race, family background, academic ability, school type (public vs. private), school level (elementary & middle vs. secondary), or the level

of satisfaction with teaching affect the decision of those with teaching experience to leave teaching ?

6. Is there any relationship between the decision to choose teaching as one's career and the decision of experienced teachers to remain in teaching?

In order to test these questions and hypotheses, a model which was based on the review of the literature and which specified the role of teachers' earnings in their occupational decisions was developed.

A Model of Teachers' Occupational Decisions

A conceptual model of causal relationships among variables in determining the occupational decisions of both prospective and practicing teachers is graphically displayed in Figure 1. While somewhat constrained by availability of data, the model permits exploring the impact of teachers' salary in combination with other important variables on both occupational decisions -- the decision to choose teaching as one's career and the decision to remain in teaching.

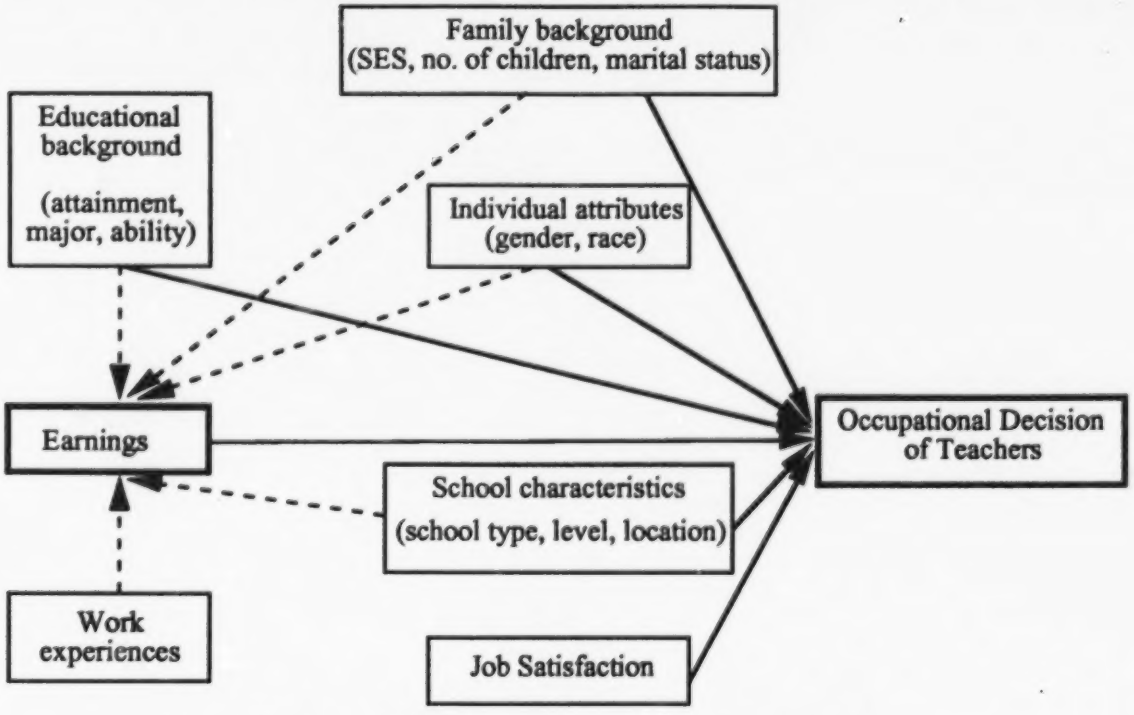

Figure 1. A Model of Teachers' Occupational Decisions

The model starts with the variables that the occupational choice theory and the results of previous research presume to affect both the decision to choose and the decision to stay in teaching, namely, earnings, work experiences, educational attainment, academic major, cognitive abilities, individual attributes, and family background. It introduces variables such as school characteristics and satisfaction with teaching as critical independent variables with regard to the retention of teachers.

The effects of the independent variables on decisions of teachers and potential teachers are carried through two routes. One is a direct path; the other is an indirect path via earnings. The educational, social, and demographic background variables have a direct effect on both

occupational decisions and also may have indirect effects through earnings. Finally, school characteristics and satisfaction with teaching have a direct effect on the decision to stay or leave teaching.

The research questions and hypotheses were tested by empirical analyses using National Longitudinal Study of the High School Class of 1972 (NLS-72) cohort data which made available longitudinal measures of respondents' family and educational background, work experiences, employment histories, and earnings during the critical years of early adulthood. Samples were divided into non-teaching career choosers and teaching career choosers, and teaching career choosers were again divided into current and former teachers according to their current job status. Since the career decisions of teachers and/or potential teachers were discrete variables as dependent variables, bivariate and univariate probit analyses were employed to estimate the effect of earnings differentials and other background variables. The results of the study were presented using descriptive analyses of the data followed by the findings of probit and ordinary least square regression analyses of the data performed in accordance with the research questions.

The Data and Sample

The subjects of this research were teachers or potential teachers who indicated either they had teaching experience or had been trained for teaching. The sample was drawn from the National Longitudinal Study of the High School Class of 1972 (NLS-72). Commissioned by the National Center for Education Statistics, the study provides a unique source of information on the transition from high school to work or further schooling.

The national longitudinal study (NLS-72) is a large-scale, long-term survey effort and is designed to provide data on a national sample of students as they move out of the high school system into the critical years of early adulthood. Consequently, data are available for 1972, 1973,1974, 1976, 1979, and 1986. The data base contains extensive information on respondents' personal family and educational background, educational activities, work experiences, employment histories, and income.

In addition to the NLS-72 base year and five follow-up surveys, two other separate studies provide data which are an important source for the analysis of educational and occupational outcomes; the Post secondary Education Transcript Study (1984) and the Teaching Supplement (1987). The NLS-72 Post secondary Education Transcript Study (PETS) involved the collection and processing of school transcripts for all members[1] of the NLS-72 cohort who had attended any form of post secondary institution since leaving high school. The PETS was designed to obtain official records -- terms of attendance, fields of study, specific courses taken, and grades and credits earned from academic and vocational schools. The Teaching Supplement, which was mailed to 1,449 respondents who indicated on the main questionnaire that they had teacher training and/or experience in teaching, is especially useful. Of these, 1,038 questionnaires were completed. The Teaching Supplement Questionnaire was designed to collect information on teaching qualifications, teaching experience, the level of satisfaction with teaching, the incentives and disincentives of the teaching profession, plans for remaining in and/or leaving teaching, and the information on the job pursued after leaving teaching.

Subjects were assigned to one of the three groups on the basis of data gathered from Teaching Supplement Questionnaire (1987): 1) non-teaching career choosers, i. e., those who have completed a degree or teacher certification requirements, but have not taught at the elementary or secondary level, 2) former teachers, and 3) current teachers. Since the sample for this study was drawn from a national longitudinal survey, there were cases in which data were missing for one or more variables. When those cases were excluded from the sample, there remained 737 valid cases for the study of attraction and 495 cases for the study of retention. This dramatic

[1] In the first through fourth follow-up surveys, approximately 14,700 members of the NLS-72 cohort reported enrollment at one or more postsecondary institutions.

reduction in the number of observations raised the possibility of obtaining biased estimates due to selectivity of the resulting analysis sample.

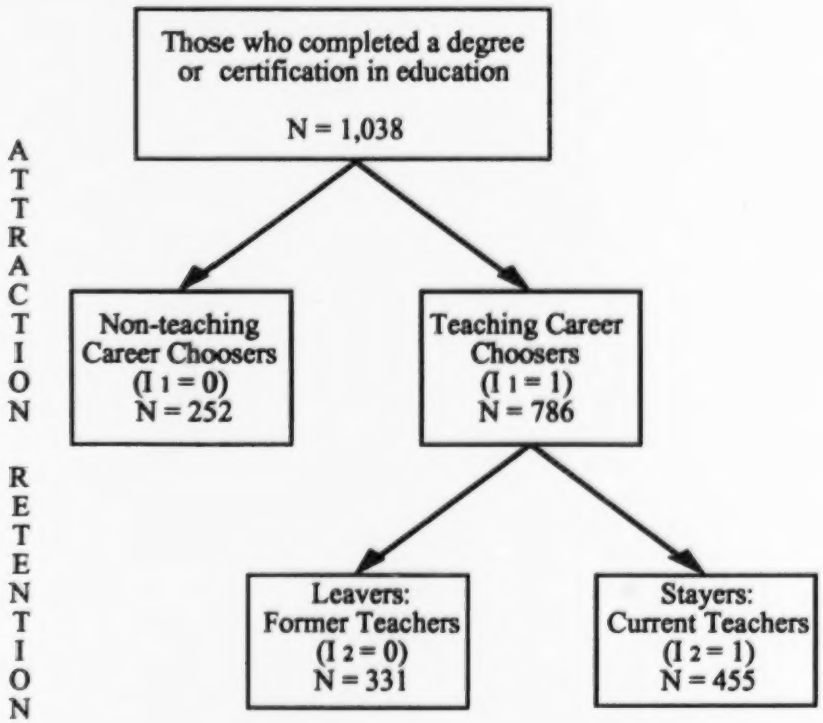

Figure 2. The Sequence of Teachers' Occupational Decisions

As a way of avoiding the loss of a large number of cases due to listwise deletion, a dummy variable for each independent variable with missing cases was included in probit regression analyses together with the matching variables to control missing observations. A dummy variable for missing cases in Scholastic Aptitude Test score (SAT; coded 0 if SAT is missing and 1 otherwise) entered probit regressions together with the SAT variable. At the same time, the mean of the SAT variable (895) is recorded for the missing cases of SAT variable. This specification of dummy variable and mean treatment for missing data does not affect the unbiasedness of the coefficient of SAT variable when the coefficient is estimated by a maximum likelihood method. As a result, 906 cases for the study of attraction, which is 87.3% of the total sample (1,038) and 642 cases out of the total sample (786) for the study of retention were available for analysis in the study.

Data Analyses: Bivariate & Univariate Probit Model

In order to answer the first research question, multiple regression was used to get estimates of the effect of independent variables on earnings. Regression analysis was based on OLS (Ordinary Least Square) estimation using the procedure called CRMODEL in LIMDEP version 5.1 (Greene, 1990). To answer the other five research questions, a bivariate and univariate probit model were used.

The expected earnings difference between teaching career choosers and non-teaching career choosers is calculated using following equations and procedures. The computation method of

earnings difference between current teachers and former teachers (Y_s-Y_l) are same as that of earnings difference between teaching and non-teaching career choosers. The selection rule or decision rule is expressed by I_1^*, which is defined by

$$I_1^* = \beta_1' X_1 + r_1 (Y_t - Y_{nt}) + \varepsilon_1 \qquad (1)$$

$$I_1 = \begin{cases} 1 & \text{if } I_1^* > 0 \\ 0 & \text{if } I_1^* \leq 0 \end{cases} \qquad (2)$$

where X_1 are all the variables which influence a person's decision. The teaching career choosers' expected earnings, Y_t is computed by

$$Y_t = \delta_1 k_1 + e_1 \qquad (3)$$

which is observed when $I_1 = 1$ and the non-teachers' expected earnings, Y_{nt} is computed by

$$Y_{nt} = \delta_2 k_2 + e_2 \qquad (4)$$

which is observed when $I_1 = 0$. Since Y_t and Y_{nt} are partially observable, OLS estimators of Y_t and Y_{nt} may cause inconsistent estimates of δ_1 and δ_2.

To correct selectivity bias in observation, M_1 and M_2 are entered as least squares along with k_1 and k_2. M_1 and M_2 correct for truncation and selectivity bias resulting

$$Y_t = \delta_1 k_1 + \lambda_1 M_1 + e_1 \qquad (5)$$

$$Y_{nt} = \delta_2 k_2 + \lambda_2 M_2 + e_2 \qquad (6)$$

where

$$M_1 = -\frac{\phi(\alpha' z)}{\Phi(\alpha' z)}$$

and

$$M_2 = \frac{\phi(.)}{1-\Phi(.)}$$

where $\alpha' z$ is derived from the reduced form equation of I_1^*,

$$I_1^* = \beta_1' X_1 + r_1 \delta_1 k_1 + r_1 \delta_2 k_2 + \eta = \alpha' z + \eta \qquad (7)$$

where using estimated values of δ_1 and δ_2, $\hat{\delta}_1$ and $\hat{\delta}_2$, which is obtained from (5) and (6). The predicted Y_t and Y_{nt} for the entire sample are calculated by

$$\hat{Y}_t = \hat{\delta}_1 k_1$$

and

$$\hat{Y}_{nt} = \hat{\delta}_2 k_2$$

for all individuals. Finally use these $\hat{Y}_t$ and $\hat{Y}_{nt}$ in (1).

The focus of this study was the population of potential teachers or teachers, and its objective is to model their decision to choose teaching as a career and then, conditional on having teaching experience, to decide whether leave or stay in teaching. This gives to rise a sequential model, in which the first decision is whether to choose teaching; the second decision is whether or not to remain in teaching conditional on having first chosen teaching as a career. This study began with the bivariate probit model with selection, addressing the interdependence of those two decisions. If it turned out to be no statistically significant relationship between two decisions, two separate univariate probit analyses applied to answer other four research questions.

The structure of the bivariate probit model that I estimated attempts to characterize correctly the nature of the decisions confronting potential teacher and reflects the fact that the decision to stay teaching is conditional on having chosen to enter the teaching profession. However, this bivariate probit with sample selection model can avoid the potential mis-specification associated with treating identically potential teachers who choose teaching a career but do not stay (i.e., former teachers) and potential teachers who do not choose teaching (and have no basis for staying), and modeling their behavior as if they were a single homogenous group. Hence, I investigated why some teachers who choose a teaching job remain in teaching while others do not.

The bivariate probit with sample selection model for this study has the following simultaneous equation system:

$$I_1^* = \beta_1' X_1 + r_1 (Y_t - Y_{nt}) + \varepsilon_1 \quad \text{Decision to choose teaching}$$

$$I_2^* = \beta_2' X_2 + r_2 (Y_s - Y_l) + \varepsilon_2 \quad \text{Decision to stay in teaching}$$

where

$$\varepsilon_j \sim N[0,1] \text{ with } \text{corr}[\varepsilon_1, \varepsilon_2] = \rho,$$

$$I_j = \begin{cases} 1 & \text{if } I_j^* > 0 \\ 0 & \text{if } I_j^* \leq 0 \end{cases} \qquad j = 1, 2$$

(I_2, X_2, Y_s, Y_l) is observed only when $I_1 = 1$.

Y_t, Y_n, Y_s, and Y_l are expected earnings for each teaching status i.e., teaching, non-teaching, stayers, and leavers. The computation of expected earnings are explained in Appendix B. Random variables, ε_1 and ε_2 have a bivariate standard normal distribution with correlation ρ. Here, we cannot observe I_1^* and I_2^* but I_1 and I_2. Notice that data on I_2 are observed only when I_1 equals 1. The bivariate probit model was estimated using the procedure called BIVARIATE PROBIT in LIMDEP version 5.1 (Greene, 1990), which employs maximum likelihood estimation.

The univariate probit model for the decision to choose teaching as a career has the following equations:

$$I_1^* = \beta_1' X_1 + r_1 (Y_t - Y_{nt}) + \varepsilon_1 \qquad I_1 = \begin{cases} 1 & \text{if } I_1^* > 0 \\ 0 & \text{if } I_1^* \leq 0 \end{cases}$$

and for the decision to remain in teaching, the probit model for a binary outcome is

$$I_2^* = \beta_2' X_2 + \tau_2 (Y_s - Y_1) + \varepsilon_2 \qquad I_2 = \begin{cases} 1 & \text{if } I_2^* > 0 \\ 0 & \text{if } I_2^* \leq 0 \end{cases}$$

where ε_1 and ε_2 follow normal distributions with mean zero and variance one. The univariate probit model was estimated using the procedure called PROBIT in LIMDEP version 5.1 (Greene, 1990), which employs maximum likelihood estimation. SPSS-X and SPSS-PC were used for data management, descriptive statistics, and preliminary OLS regressions.

Results

The first research question dealt with whether or not the earnings of individuals would be affected by their social and demographic background, educational background, and work experience. To answer the question, four hypotheses were established. As the human capital theory predicted, the data indicated that more educated workers received higher wages and salaries than those with less education. The findings also included a strong correlation between earnings and work experience. The hypothesis that the earnings of male teachers are lower than for other male earners was supported. The average income of male current teachers was $20,122 in 1985, while that of former male teachers was $25,244 and that of non-teaching male career choosers $20,582, conditioning on full-time employment. The assumption that the income difference between female teachers and other female members of the college educated labor force was less than in case of males was also confirmed. The results of this study also indicated that males consistently had higher earnings than females and that the sex differentials of earnings in teachers were small relative to those in other occupations. Considering only own earnings, the average wage of males in 1985 was $21,137, whereas that of females was $14,199. Although the earnings difference between male and female former teachers was more than $10,000 conditioning on full-time employment, the difference for current teachers was $2,324. The final hypothesis concerning earnings was that teachers' salary increases were based on seniority and educational credits beyond the bachelors degree was supported by the results.

The second research question, i.e., whether the difference between the earnings from a teaching job and from potential alternative jobs affect the decision to choose teaching as a career, provided some interesting answers when the data were reanalyzed on the basis of gender. The study revealed that the salary differentials that exist between teaching and other employment opportunities seemed to be a more influential factor in the career decisions of male potential teachers. Since a substantial number of female former teachers who were not currently employed as full-time workers were included in the sample of teaching career choosers, and females comprised a majority (71.3%) of the total sample, the results did not confirm the hypothesis that the lower are teachers' salaries relative to an alternative occupation, the less the attraction of teaching. Another explanation for this result can be developed from the fact that the economic status of teachers has been lower than the status of many other occupations pursued by college graduates. Thus salary level likely is not the primary reason why potential teachers would choose teaching as a career. The most important reason respondents gave for wanting to enter teaching was not the salary expected but a strong sense of vocation such as desire to work with children, interest in the subject they would teach, or a desire to be engage in a job that they feel would be socially worth while. These findings support the evidence provided by earlier studies that most practicing teachers say they are in the profession for reasons other than money, mainly having to do with their intrinsic desire to teach (Bacharach, Lipski, & Shedd, 1985).

Table 1. Ordinary Least Square Regression of Social, Demographic and Educational Background Variables for (log) Earnings

	Variables	Coefficient	t–Statistic
Social and Demographic Background	Race	0.5081	1.44
	Gender	-1.4066	-5.88*
	No. of Children	-0.7633	-7.74*
	SES	-0.6280	-2.80*
Educational Background	SOMECOL	-1.1225	-1.71**
	MASTER	0.2875	1.19
	DOC	0.1749	0.23
	MSmajor	0.1170	0.28
	GENGPA	-0.3548	-1.47
	SAT	0.0003	0.47
	DMSAT	-0.2010	-0.72
	Work Experience	0.2917	7.61*
	Constant	9.0324	10.19*
	R-squared	0.1903	
Observations		906	

Note: * Statistically significant at the 5% level .
** Statistically significant at the 10% level.

Table 2. Earnings of Total Sample by Background Variables

	Variables	Mean	SD	N	F-Stat.
Gender	Male	21137.1	11037.8	260	
	Female	14199.2	10802.2	646	71.52*
Race	White	15951.8	11409.8	804	
	Non-White	18069.4	10339.5	102	3.18**
No. of Children	0	18885.3	9385.5	337	
	1	16052.6	9960.2	194	
	2	14164.4	13201.1	259	
	3-4	13140.2	12433.2	109	
	5-6	12698.6	11007.8	7	9.35*
SES	High	15289.2	11494.8	349	
	Med/Low	16754.7	11164.2	557	3.61**
MSmajor	Math/Science	18595.3	11499.1	62	
	Other major	16013.5	11281.5	844	3.02**
SAT	400 - 800	15422.0	11130.9	250	
	801 - 1000	15833.4	10545.3	441	
	1001-1200	17369.2	12090.8	171	
	1201-1600	19548.1	15381.2	44	2.46**
GENGPA	less than 2.24	14305.5	8915.5	56	
	2.24 - 2.74	16808.7	11490.2	198	
	2.741 -3.24	15858.3	10459.4	327	
	3.241 -3.74	16603.0	12758.4	268	
	3.741 - 4.0	15856.5	10240.7	57	0.71
Total		16190.2	11308.9	906	

Note: * Statistically significant at the 5% level.
** Statistically significant at the 10% level.

The third research question, i.e., whether different characteristics of teachers affect the decision to choose a teaching career, revealed that several of the background variables examined in this study had statistically significant relationship to the decision to enter teaching. The socioeconomic status of the individual's family when they were in high school was negatively related to the probability that the subject would decide to choose teaching. Potential teachers from low or middle SES households, master or doctoral degree holders, low SAT scorers, and those who had a high GPA in college were more likely to choose a teaching career. The patterns of

response differed by gender. For males, an academic major in mathematics or sciences had a positive influence on the decision to enter teaching. For females, high SAT scores in high school were negatively associated with the decision to choose teaching with the findings supporting the results obtained in previous studies (Manski, 1984; Thengaraj, 1985).

Table 3. Univariate Probit Results: The Decision to Choose Teaching by Gender
N=906

Observations		Male N=260		Female N=646	
Variables		Coef.	t-Stat.	Coef.	t-Stat.
Social & Demographic Background	Race	0.42	1.08	-0.12	-0.62
	SES	-0.08	-0.42	-0.00016	-0.0013
Educational Background	SOMECOL	-3.18	-2.93*	-0.21	-0.66
	MASTER	-0.71	-2.27*	-0.11	-0.65
	DOC	-1.81	-2.77*	0.19	0.37
	MSmajor	0.74	2.12*	-0.21	-0.88
	GENGPA	0.10	0.55	0.30	2.23*
	SAT	-0.00048	-0.86	-0.0012	-3.27*
	DMSAT	-0.31	-1.35	-0.22	-1.34
Income Difference	Yt-Ynt	0.54	3.10*	-0.35	-6.48*
Constant		-0.06	-0.07	-2.01	-3.01*
Log-Likelihood		-139.65		-312.18	

Note: * Significant at 5% level
** Significant at 10% level

Table 4 Univariate Probit Results by Gender: The Decision to Stay in Teaching
N=642

Observations		Male N =181		Female N = 461	
	Variables	Coef.	t-Stat.	Coef.	t-Stat.
Social & Demographic Background	Race	-1.64	-0.62	-0.19	-0.82
	No of Children	0.02	0.18	-0.25	-3.45*
	Marital Status	0.36	1.11	0.22	1.18
Educational Background	SOMECOL	3.32	0.73	-0.84	-1.83**
	MASTER	-0.55	-0.81	0.74	4.61*
	DOC	0.53	0.29	-2.52	-3.31*
	MSmajor	0.44	1.32	0.23	0.75
	GENGPA	0.96	1.26	-0.31	-1.86**
	SAT	-8.2E-5	-0.12	-3.1E-4	-0.69
	DMSAT	0.06	0.22	-0.11	-0.64
Income Differences	Ys-Yns	1.88	0.74	-0.27	-4.57*
Job Satisfaction & School Characteristics	Satisfaction I	0.63	3.36*	0.18	1.63
	Satisfaction II	0.35	3.73*	0.25	4.25*
	School Type	-0.83	-1.66*	-1.09	-5.40*
	School Level	-0.24	-0.49	-0.63	-4.11*
	School Location	1.28	0.62	-0.23	-1.53
Constant		6.41	1.44	2.02	2.76*
Log-Likelihood		-91.402		-253.049	

Note: * Significant at 5% level
** Significant at 10% level

The fourth question -- does the difference between the earnings from a teaching job and from alternative jobs affect the decision to leave teaching by those who have teaching experience -- provided an unexpected result with negative sign. Again, this finding appears to be due to the fact that a majority of the sample was comprised of females and the average earnings level of female leavers was lower than that of female stayers. However, the pattern of male teachers indicates they were sensitive to the earnings difference between teaching and alternative occupations when they considered whether or not to leave teaching. If the expected earnings of teachers were less than those of alternative jobs, they were less likely to stay in teaching. The descriptive statistics of the reasons given by the decision to leave teaching supported this finding. For males, low salaries were the most important reason to leave, while female former teachers considered family responsibilities as the most important reason. As previous researchers (Zabalza,1979; Stern, 1986) argued, the behavior of female teachers was less dependent upon conventional economic forces that was the behavior of male teachers.

The fifth research question -- do the years of education, gender, race, family background, academic ability, school type, school level, the location of school, and/or the level of satisfaction with teaching affect the decision of those with teaching experience to leave teaching -- yielded some interesting answers. Master degree holders, females, teachers who had less children, public school teachers, or elementary teachers were more likely to remain in teaching than their counterparts. Satisfaction with teaching had strong positive effects on the decision to stay; the more teachers were satisfied with teaching, the more likely they would remain in teaching.

The final research question, whether the decision of potential teachers to choose teaching as a career influenced the decision of experienced teachers to remain in teaching, yielded an expected result. The result of bivariate probit regression showed that there was no statistically significant relationship between the two decisions; the potential teachers did not consider whether they would leave or not when they decided to choose teaching as a career.

Conclusions

The results of this study support the proposition upon which this thesis was based. Findings clearly indicate that our understanding of the role of teachers' salaries in career decisions is enhanced when the theory of occupational choice is brought into consideration. In this respect, the model of teachers' occupational decisions was particularly helpful in providing a context for exploring the effects of teachers' earnings along with the effects associated with non-economic variables. The model of occupational choice developed in this study indicates, consistently with other approaches, that earnings expected are an important variable in the selection of an occupation. The finding that the level of teachers' earnings relative to alternative occupations pursued by college graduates has a direct effect on occupational decisions of prospective and current teachers is not surprising in view of economic theory, i.e., comparative advantage theory, and previous research.

On the whole, the empirical evidence analyzed supported most of the research hypotheses. The analyses of attraction and retention showed that, among men, both prospective and practicing teachers respond to interoccupational wage differences in deciding to choose and change occupations. However, the effects of salary differentials between teaching and alternative occupations available to teachers were only true for males. Women showed, in general, a much lower response to earnings than did men and after leaving teaching, many women did not accept other employment; they left teaching to devote more time to take care of children and to do other family responsibilities. This result may be related to the secondary earner role played by females within the context of family.

The results of the analyses confirmed the effects of various predictors of choosing and leaving teaching -- gender, race, family background, the level of teaching, school type, subject specialty, and satisfaction with teaching. In particular, the finding of the effect of school level can be interpreted as supporting higher salaries for junior high school and/or secondary school teachers

than for elementary school teachers and for mathematics or science teachers than for other academic major, because secondary school teachers and teachers with a math or science major seem to be more sensitive to salary differences.

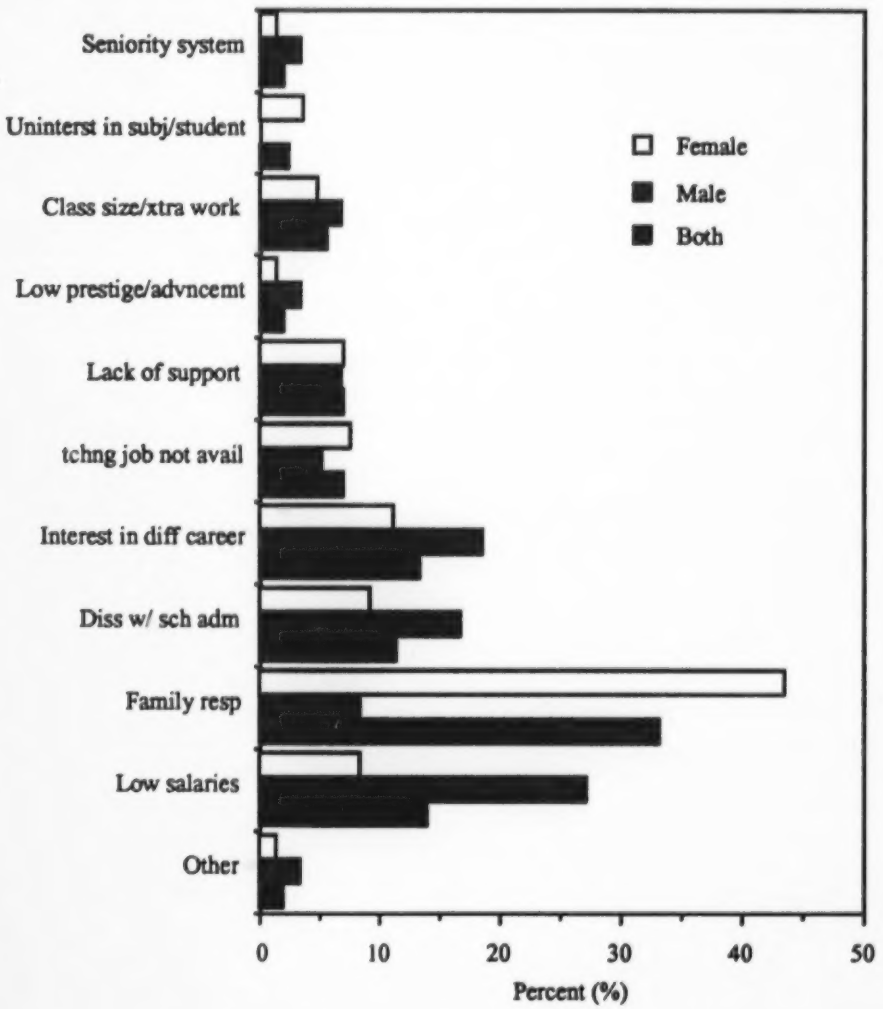

Figure 3. Most Important Reason to Leave Teaching

Note: Other reasons include large class sizes and lack of discipline in the school, and no opportunities to teach less than a full-time load

As a result, the analyses produced a particularly interesting finding; while money is not the primary factor in deciding to choose teaching as a career, it is a major factor in the decision to leave teaching. As Goodlad (1983) commented, teachers begin their careers with an intrinsic motivation, i.e., a willingness to forgo higher salaries, anticipating rewards intrinsic to their work, but if these expectations are frustrated, salaries become a source of considerable job dissatisfaction, which is often manifested in high rates of turnover.

The Significance of the Study

This study, while somewhat constrained by available data, contributes to theory by offering an improved framework for understanding how the level of teachers' salaries affect both attraction and retention of individuals in teaching. It also contributes to the literature on the economics of education in that it sheds light on a key aspect of the debate concerning whether monetary incentives could attract and retain qualified teachers. In this respect, findings indicate that understanding the role of teachers' earnings can be enhanced by simultaneously considering economic and non-economic theories.

Thus, the strengths of the study derive primarily from the theoretical framework followed and the research design employed. The findings promise to expand knowledge concerning the economic theory of occupational choice as it relates to teaching. This study not only relies on a theoretical framework but also uses a national panel data base which provides extensive and reliable information about respondents.

Finally the estimated effects of probit analysis promise to be more reliable and valid than previous research. Probit regression is a very efficient and appealing method to analyze the effect of independent variables on the dichotomous nature of dependent variables.

Overall, the results of the study suggest that salary policies will have an effect on teacher shortages and turnover. Thus recent actions in many states and localities to raise teachers' salaries could attract more new teachers and reduce turnover among experienced teachers.

Limitations

Limitations can be summarized as follows. First, the study's ability to test the model of teachers' occupational decisions is constrained by the characteristics of the data base, i.e., NLS-72. The absence of indicators in the data base regarding the region in which respondents lived in 1986 and both beginning salary and earnings in later years from either teaching or non-teaching jobs along with employment history, constrained the analysis of the expanded model and hypotheses. In particular, it was not possible to obtain data concerning initial earnings and an earnings profile for every job the subject held. According to Willis and Rosen (1979), earnings should be observed at two points in the life cycle for each person, one point soon after entrance to the labor market and another point some 20 years later. However, the average age of the sample in this study was 32 years and their work experience in 1986 was less than 16 years. Therefore, it was impossible to obtain earnings data at the second point and to estimate growth rate. The interpretation of the data also rests on a number of maintained assumptions and thus should be done with caution.

Secondly, this study has some inevitable fragility owing to the conceptual framework used which ignores most of the non-pecuniary preferences of potential and/or experienced teachers. Though the study was designed to test the impact of teachers' salaries on teachers' occupational decisions, the difference in other non-monetary characteristics of teachers among those who did not choose teaching as a career, those who leave, and those who stay in teaching should be considered in the future.

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